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A. PROJECT DESCRIPTION & SCOPE

RFP A: This Request for Proposal (RFP) directs the contractor to provide consultants for ProEngineering and Drawing Checking support. This revision shall also adjust target values to reflect actual efforts to date.

<u>Basic:</u> The purpose of this Revision is to define project scope continued from CY6/FY08 defined in Task Order (TO) 6SPI00389, Revision A. Unless specifically addressed below, the scope of work defined in 6SPI00389, Revision A remains unchanged.

This Revision also changes the NASA Task Order Manager from Joseph Porta to Alan Littlefield. This TO also incorporates PLC rate changes required by Contract Mod No. 81. [JEP]

CY6/FY08 Activity

Engineering support activities continued throughout CY6/FY08 and evolved as the subsystem and element projects matured. Subsystems completed 30% design reviews and Preliminary Design Review (PDR) for the Mobile Launcher (ML). Effort was less than anticipated and labor target values have been adjusted to reflect actual effort for CY6/FY08.

CY7/FY09 - CY8/FY10 Activity

Development activities will continue into CY7/FY09 and evolve as the subsystem and element projects mature. Subsystems will proceed to 60%, 90% and 100% design, as well as the ML Critical Design Review (CDR) in CY8/FY10. Under the direction of the NASA Lead Design Engineer (LDE), the contractor shall support the completion of the design for Umbilical Systems, Access Systems, and Vehicle Stabilization & Damping System (VSDS) through 100% design / CDR completion. The contractor shall also support the development of all required documentation per KDP-P-2713, *Technical Review Process*. During CY8/FY10, each subsystem will progress to prototype fabrication and testing after completing its design review cycle.

This Task Order (TO) directs the contractor to provide the support required to perform final design on Ground Support Equipment (GSE) for the Crew Launch Vehicle (CLV) ML. This design includes the Upper Stage (US) Aft Skirt LO2 umbilical, US Aft Skirt LH2 umbilical, US Instrument Unit umbilical, Service Module umbilical, First Stage (FS) Forward Skirt umbilical, FS Aft Skirt Electrical umbilical, FS Aft Skirt GN2 Purge umbilical, Crew Access Arm (CAA), Access Arms (AA), VSDS, and the development of Space & Weight drawings. This support provides for the: (1) development of requirements, (2) development of concepts, (3) fabrication of prototypes, (4) design / analysis, and (5) ROM cost estimates and implementation schedules. Also included is the support required for the development of an umbilical prototype which includes fabrication, installation support, and umbilical testing.

The contractor shall provide technical expertise and engineering support for the definition and development of Concept of Operations (ConOps), requirements document, system block diagrams, layout drawings, assembly drawings, installation drawings, ElectroMechanical Control Diagrams (EMCD), design analysis, Space and Weight drawings, field investigations, System Mechanical Schematics (SMS), procurement and installation specifications, Operations and Maintenance Requirements and Specifications Document (OMRSD), Materials & Processes (M & P), cost estimates, schedules, trade studies, Interface Control Drawings (ICDs), requirements traceability matrices, transportation plan, proof loading plans, logistics support analysis, and CDR support (as defined in KDP-P-2713).

The NASA Design Engineering (NE) Mechanical Systems Division is presently responsible for requirements, design, development, fabrication, testing, installation and validation of Mechanical Launch Accessories

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and Mechanical Systems required for the ML to support the Constellation Program.

Multiple design teams will be led by the NASA LDE. The contractor shall support the designs, design reviews and meetings as required.

. Tracking of hours and ODC will be done at the subtask level.

Project Management & Project Administration support will be tracked as subtask 001 Engineering Management oversight will be tracked as subtask 002

Task 1.1 will be tracked as subtask 003 Task 1.2 will be tracked as subtask 004

Task 1.3 will be tracked as subtask 006

Task 1.4 will be tracked as subtask 007

Task 1.5 will be tracked as subtask 008

Task 1.6 will be tracked as subtask 009

Task 1.7 will be tracked as subtask 010

Task 2.1 will be tracked as subtask 011

Task 2.2 will be tracked as subtask 014

Task 3.0 will be tracked as subtask 012

Task 4.0 will be tracked as subtask 016

Task 5.0 will be tracked as subtask 015

Task 6.0 will be tracked as subtask 013

Task 7.0 will be tracked as subtask 021

Task 8.0 will be tracked as subtask 022 Task 9.0 will be tracked as subtask 023

Task 10.0 will be tracked as subtask 019

TO schedule support will be tracked as subtask 020

The preliminary requirements are defined by CxP 70000, Constellation Architecture Requirements Document (CARD); CxP 70023, Design Specification for Natural Environments; CxP 70028, Ground Systems to CEV Interface Requirements Document (IRD); CxP 70052, Ground Systems to CLV IRD; CxP 72034, SRD and CxP 72121, GSE Requirements Document.

All designs shall be in compliance with KSC-DE-512-SM Facility, System and Equipment General Design Requirements and NASA-STD-5005, Standard for the Design of GSE. All drawings shall be compliant with GP-435, Engineering Drawing Practices, Aerospace and GSE.

B. TASKS

- 1.0 The contractor shall provide technical and engineering support for the design of the following Umbilical Systems during the 60%, 90%, and 100% design phase.
- 1.1 US Aft Skirt LO2 Umbilical
- 1.2 US Aft Skirt LH2 Umbilical
- 1.3 US Instrument Unit Umbilical
- 1.4 Service Module Umbilical

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- 1.5 FS Aft Skirt Electrical Umbilical
- 1.6 FS Aft Skirt GN2 Purge Umbilical
- 1.7 FS Forward Skirt Umbilical
- **2.0** The contractor shall provide technical and engineering support for the design of the following <u>Access Systems</u> during the 60%, 90%, and 100% design phase.
- 2.1 Crew Access Arm
- 2.2 Access Arms
- 3.0 The contractor shall provide technical and engineering support for the design of the <u>VSDS</u> during the 60%, 90%, and 100% design phase.
- 4.0 The contractor shall provide technical and engineering support for fluid systems development. -
- 5.0 The contractor shall provide technical and engineering support for the continued testing of a <u>Tilt-Up-Umbilical Arm (TUUA) prototype</u>.
- 6.0 The contractor shall support the development and maintenance of Launch Accessory <u>Pro/E Models</u> (Parts and Assemblies) and the maintenance of the ML Pro/E Assembly Model.
- 7.0 The contractor shall provide engineering and technical expertise to support the <u>fabrication</u> <u>of all Launch Accessories</u> listed.
- **8.0** The contractor shall provide technical and engineering support for the <u>fabrication and installation of Launch Accessory Prototypes</u>, as required to support the various design efforts. Prototype design shall include all necessary equipment required to support the prototype and prototype testing.
- 9.0 The contractor shall provide Pro/E ML GSE installation design support.
- 10.0 The contractor shall provide electrical engineering support.

C. MILESTONES/DELIVERABLES

1. - Support for 60% design review for US Aft Skirt LO2 Umbilical.

Start Date: 10/01/2008End Date: 01/12/2009

2. - Support for 90% - 100% design review for US Aft Skirt LO2 Umbilical.

Start Date: 01/13/2009End Date: 08/14/2009

3. - Support for 60% design review for CLV US Aft Skirt LH2 Umbilical.

Start Date: 10/01/2008End Date: 12/12/2008

4. - Support for 90% - 100% design review for CLV US Aft Skirt LH2 Umbilical.

Start Date: 12/15/2008**End Date**: 07/31/2009

5. - Support for 60% design review for CLV Instrument Unit Umbilical.

Start Date: 10/01/2008End Date: 11/12/2008

6. - Support for 90% - 100% design review for CLV Instrument Unit Umbilical.

Start Date: 11/13/2008End Date: 06/30/2009

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7. - Support for 60% design review for CLV Service Module Umbilical.

Start Date: 10/01/2008End Date: 01/27/2009

8. - Support for 90% - 100% design review for CLV Service Module Umbilical.

Start Date: 01/28/2009End Date: 08/28/2009

9. - Support for 60% design review for FS Aft Skirt Electrical Umbilical.

Start Date: 10/01/2008End Date: 04/29/2009

10. - Support for 90% - 100% design review for FS Aft Skirt Electrical Umbilical.

Start Date: 04/30/2009End Date: 12/15/2009

11. - Support for 60% design review for FS Aft Skirt GN2 Purge Umbilical.

Start Date: 10/01/2008End Date: 04/29/2009

12. - Support for 90% - 100% design review for FS Aft Skirt GN2 Purge Umbilical.

Start Date: 04/30/2009End Date: 12/15/2009

13. - Support for 60% design review for FS Forward Skirt Umbilical.

Start Date: 10/01/2008End Date: 02/27/2009

14. - Support for 90% - 100% design review for FS Forward Skirt Umbilical.

Start Date: 03/02/2009End Date: 10/15/2009

15. - Support for 60% design review for CLV Crew Access Arm.

Start Date: 10/01/2008End Date: 03/02/2009

16. - Support for 90% - 100% design review for CLV Crew Access Arm.

Start Date: 03/03/2009End Date: 07/15/2009

17. - Support for 60% design review for ML Access Arms.

Start Date: 10/01/2008End Date: 06/15/2009

18. - Support for 90% - 100% design review for ML Access Arms.

Start Date: 06/16/2009End Date: 01/29/2010

20. - Support for 60% design review for VSDS.

Start Date: 10/01/2008End Date: 02/12/2009

21. - Support for 90% - 100% design review for VSDS.

Start Date: 02/13/2009End Date: 09/30/2009

22. - Project and Engineering Management support.

Start Date: 10/01/2008End Date: 03/31/2010

D. STANDARDS OF PERFORMANCE (METRICS)

1. - Task Order metrics will be collected in accordance with the USTDC Internal Surveillance Plan.